

Smart Buildings: Advanced Materials and Nanotechnology to Improve Energy-Efficiency and Environmental Performance (Woodhead Publishing Series in Civil and Structural Engineering)

By Marco Casini

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Smart Buildings: Advanced Materials and Nanotechnology to Improve Energy-Efficiency and Environmental Performance (Woodhead Publishing Series in Civil and Structural Engineering) By Marco Casini

Smart Buildings: Advanced Materials and Nanotechnology to Improve Energy Efficiency and Environmental Performance presents a thorough analysis of the latest advancements in construction materials and building design that are applied to maximize building efficiency in both new and existing buildings.

After a brief introduction on the issues concerning the design process in the third millennium, Part One examines the differences between Zero Energy, Green, and Smart Buildings, with particular emphasis placed on the issue of smart buildings and smart housing, mainly the ‘envelope’ and how to make it more adaptive with the new possibilities offered by nanotechnology and smart materials.

Part Two focuses on the last generation of solutions for smart thermal insulation. Based on the results of extensive research into more innovative insulation materials, chapters discuss achievements in nanotechnology, bio-ecological, and phase-change materials. The technical characteristics, performance level, and methods of use for each are described in detail, as are the achievements in the field of green walls and their use as a solution for upgrading the energy efficiency and environmental performance of existing buildings.

Finally, Part Three reviews current research on smart windows, with the assumption that transparent surfaces represent the most critical element in the energy balance of the building. Chapters provide an extensive review on the technical features of transparent closures that are currently on the market or under development, from so-called dynamic glazing to bio-adaptive and photovoltaic glazing. The aesthetic potential and performance limits are also be discussed.

- Presents valuable definitions that are given to explain the characteristics,

requirements, and differences between ‘zero energy’, ‘green’ and ‘smart’ buildings

- Contains particular focus on the next generation of construction materials and the most advanced products currently entering the market
- Lists both the advantages and disadvantages to help the reader choose the most suitable solution
- Takes into consideration both design and materials aspects
- Promotes the existence of new advanced materials providing technical information to encourage further use and reduce costs compared to more traditional materials

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Editorial Review

From the Back Cover

Specialising in the energy-efficiency and environmental performance of buildings, *Smart Buildings: Advanced Materials and Nanotechnology to Improve Energy-efficiency and Environmental Performance* provides readers with a state-of-the-art review on the latest advancements in construction materials and building design.

After a brief introduction about the issues concerning the design process in the third millennium, Part One examines the differences between Zero Energy, Green and Smart Buildings. Particular emphasis is placed on the issue of smart buildings and smart housing, mainly the ‘envelope’ and on how to make it more ‘"adaptive." Part Two focuses on the last generation of solutions for smart thermal insulation. Based on the results of extensive research into more innovative insulation materials, chapters discuss achievements in nanotechnology, bio-ecological and phase-change materials. Finally Part Three reviews current research on smart windows, with the assumption that transparent surfaces represent the most critical element in the energy balance of the building, whilst at the same time one of the most significant components of contemporary architectural quality.

This book takes into consideration both design and materials aspects, with particular focus on the next generation of construction materials, and the most advanced products currently entering the market as high priority, energy efficient building envelope components.

Marco Casini has been a Professor of Architecture Technology and of Environmental Certification of Buildings at "Sapienza" University of Rome since 2002. He is Scientific Director of the Editorial Board of the Journal "Ponte" and his research areas include zero energy, green and smart buildings and nanotechnologies, smart materials and renewable energy for buildings.

About the Author
Marco Casini has been a Professor of Architecture Technology and of Environmental Certification of Buildings at “Sapienza” University of Rome since 2002. He is Scientific Director of the Editorial Board of the Journal "Ponte" and a member of the Editorial Board of the Journal of Civil Engineering and Architecture, David Publishing, NY. He is also a member of the Inter-regional Working Group for Sustainable Construction at the Italian Institute for Innovation and Transparency in Government Procurement and Environmental Compatibility. He carries out research in the fields of zero energy, green and smart buildings and nanotechnologies, smart materials and renewable energy for buildings. He has written many essays, articles and proceedings and is the author of "Designing the efficiency of buildings: Certification of energy and environmental sustainability" (Roma, DEI, 2013), "Building the environment: Tools and methods of environmental design" (Milano, Edizioni Ambiente, 2009), and "EMAS Eco-Management and Audit Scheme" (Milano, IlSole24Ore, 2004).

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